Effect of Topical Fluoride on Retention of Pit and Fissure Sealants
Critical Analysis

3/29/2010
University of Michigan Degree-Completion
Jennifer Smits, RDH, AAAS
HYGDCE 483
Effect of Topical Fluoride on Retention of Pit and Fissure Sealants: A critique

Dental sealants and their effectiveness of retention after a fluoride treatment has been a personal and professional topic of debate since I attended hygiene school and many years prior. *Effect of Topical Fluoride on Retention of Pit and Fissure Sealants*, a research report, discussed this very topic. Dental sealants were first discovered in the 1970s and 1980s and have had proven effectiveness for prevention of dental caries in various randomized control trials.¹ This research report addressed how well two types of sealants, light-cured (CLC) and self-cured (CSC) were retained if placed before or after a fluoride treatment. While this research report draws important facts to dental professionals’ knowledge, it fails to include pertinent information that is valuable to the experiment.

An oversight in this research report is that the authors fail to mention specifically what prompted this experiment. Perhaps mentioning how sealants can provide substantial economical savings when used for preventative measures as opposed to restorative work necessary when caries are present and composite fillings are needed.² Although a statement of the problem was not specifically mentioned, this article implied whether or not fluoride or sealant type would adversely affect the bond strength of enamel and sealants. A hypothesis was implied that there would be no difference of sealant retention between the two types of sealants if fluoride is used/not used prior to placement. The significance of the fluoride was mentioned in that it can reduce enamel solubility to the acid etch, which is placed just prior to sealant application. The variable of interest in this research report seemed a bit conflicted. Perhaps this research could have been better if the topic focused on one independent variable (either sealant type or application of fluoride).

Using two types of sealants and determining retention after fluoride is a complex factorial design. However, readers are left to wonder topic do the authors want to research information on more.
The researchers fail to address what topic, either type of sealant material or fluorides effect on retention of sealants, they want to research information on more. Sticking to one variable of interest would be beneficial for the reader to have a better idea on what the goal was of this report. The initial review concluded with the statement that “to date, no clinical studies have been published comparing the retention of sealants on fluoridated versus non-fluoridated teeth.” Therefore, discovering information on this subject was the goal of this experiment.

The authors were very descriptive on who was involved for the sample and informed the readers that tooth surfaces from human subjects were the interest. Thirty-five first year entering dental hygiene students volunteered for this study. Unfortunately, although convenient, this volunteerism leads to a form of bias. There was no mention of characteristics that this volunteer group possessed. First, volunteers may have been from different ethnicities. For example, Asian cultures commonly have the anomaly of dens evaginatus exhibiting a protrusion on their posterior teeth as well as lingual surfaces of anterior teeth. This could ultimately alter/inhibit sealant retention. Moreover, this study did not attempt to equalize the number of molars and premolars used in this study. Age, diet, and oral hygiene care could also be factors that could possibly alter sealant retention. If there were more precise sample volunteers, tools used for home care, and similar diets/age, the confidence in the results could be much higher. While the lack of information on the participants in the research in problematic, the authors did mention that subjects were under informed consent.

The authors did mention that informed consent was established as well as written approval by the Committee on Protection of Human Subject of UTHHSC before the study began. Subjects were then examined to determine whether or not they met the criteria of caries free, virgin molars/pre-molars and no medical contraindications for treatment. However, the mode of caries detection was not clear. Readers who did not participate in the design of the experiment are left wondering if the subjects were
evaluated by radiographs, Diagnodent, or perhaps other various technological adjuncts. Various methods could produce different decay readings. In order to provide reliability, there should be a consistency in caries measuring instruments.  

To help aid in eliminating bias, a control group was essentially used in this experiment. The patients served as their own control group doing a split-mouth design. CLC sealants were placed in quadrant 1 and CSC sealants were placed in quadrant 2 prior to fluoride application. Thereafter, CLC sealants were placed in quadrant 3 and CSC sealants were placed in quadrant 4 following fluoride application. The lowered the number of necessary participants, therefore increasing statistical efficiency. Lowering the amount of participants could help reduce time consumption and speed along the research, therefore revealing results faster. The hidden assumption in this experiment is that the sealants were placed with no assistance. This could have potential bias. For instance, those who have an assistant providing high volume evacuation (HVE) and cheek retraction could open the field of vision for the clinician who is applying the sealant. This could minimize contamination, (i.e. saliva contacting dry tooth surface) and therefore provide better sealant retention. Also, the CSC could provide dramatic simplification of what is involved in sealant application. Therefore, patient compliance could be higher, time could be minimized, and possible errors in one’s technique can be minimized as compared to the CLC.  

Variables were operationally defined in this article for certain clinical criteria information necessary to measure sealant retention. This involved recording a sealant that was either a) fully intact, b) partially intact, c) missing, or d) caries present. Retention was monitored for 18 months by an examiner who was blind to which group the subject was assigned to, which helped to reduce bias. The patients who were evaluated were also chosen at random, reducing bias. The collection of the data consisted of intra-rater reliability in the first clinical evaluation of this study. Having one examiner allows
the measurements to be more precise and accurate as opposed to various examiners whom may have varying opinions of sealant retention.

The results were presents in both a chi-square analysis and sealant retention chart at 6, 12, and 18 months for both light/self cured sealants as well and fluoride application. The authors stated that an improvement of this experiment could be to control and examine various fluorides that can be used. This particular experiment used application of topical 1.23% acidulated phosphate fluoride (Oral-B) which was applied in trays for four minutes to thoroughly dried teeth. Many offices, however, may strictly use fluoride varnish, and not a gel or foam. Higher precision can be possible if the authors experiment with various fluorides and monitor sealant retention.

Ultimately both groups retained varying prognosis, with retention greater on fluoridated teeth when CLC material was applied. It was suggested by the authors that perhaps having a 2-year interval to check sealant retention would be beneficial. The success of sealant retention should be long term. This vigilant recall as well as possible repair may be necessary to keep tooth surfaces caries free. Although this research is beneficial; it needs to be done correctly to find real answers. Subject pools, sticking to one subject topic and repetitive experiments need to be improved/established in order to take the results seriously. With added research and numerous studies, the effect of pit/fissure sealant retention and fluoride application may become factual rather than a topic of debate for many dental professionals.
References


